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ABSTRACT

This document describes a generalizable process for assessing needs and prescribing instructional resources which was piloted in the science teaching project of the Pennsylvania Department of Education entitled Investigative Science for Elementary Education (ISEE). Based on careful consideration and analysis of a number of information and dissemination models--especially Havelock's Linkage Model--and a variety of communications models, this theoretical model was designed for the dissemination and utilization of information. An important feature is a computerized database of information linking important instructional problems in elementary science with available solutions. The model was piloted, evaluated, and refined in real situations in many Pennsylvania school districts. Proposals are currently under consideration to apply the model to other instructional subject areas as well as in other geographical regions. (Author/JEG)

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A COMPUTERIZED DIAGNOSTIC-PRESCRIPTIVE PROCESS FOR ASSESSING NEEDS AND PRESCRIBING INSTRUCTIONAL RESOURCES

A Presentation at the 1979 Convention

of the

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A Computerized Diagnostic-Prescriptive Process for
Assessing Needs and Prescribing Instructional Resources

Introduction

Whenever a new instructional innovation is introduced or when a new instructional resource is developed, the need arises to fit it into the actual classroom situation in a way that would make it the most useful and effective. This can be achieved if the innovation or the resource is presented to the user as a means to solve a problem or as a tool to upgrade the user's performance.

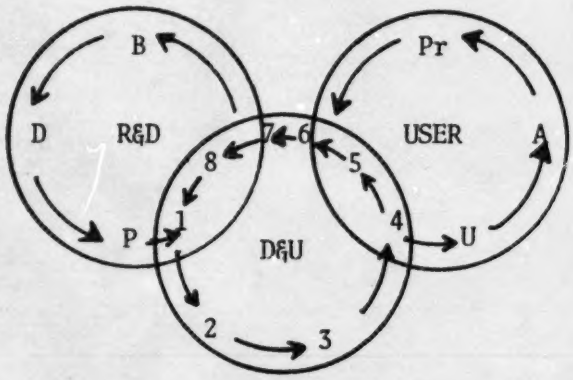
The diagnostic-prescriptive process introduced here is designed to achieve the above-mentioned approach by a combination of a theoretical dissemination model and a practical computerized process that applies it to an existing instructional project.

The practical situation chosen for the application of the process was the science teaching project of the Pennsylvania Department of Education entitled Investigative Science for Elementary Education (ISEE). This project encompasses a wide variety of resources, aids, teaching strategies and communication media. For that reason, it was viewed as an ideal subject for piloting a theoretical dissemination process.

The Model

The theoretical model for the improvement of dissemination is based on an elaboration of the linkage theory (Havelock). It introduces a specialized function for linkage, the Dissemination-Utilization domain. This domain serves as a link between Research and Development on one hand and the User on the other hand by assessing the user's needs and problems, organizing his resources and matching the results of this needs assessment with solutions and suggestions from the Research and Development domain.

The model may be represented schematically by three partially overlapping circles:



Research and Development (R&D)

This domain includes basic research leading to applied Research and Development (D). The products of this process (P) are transferred to the next domain, Dissemination and Utilization (D&U).

User

The user accepts processed R&D products from D&U and utilizes them (U). In the process of utilization, the user assesses the products (A) and formulates the problems (PR) he encounters in this process.

Dissemination and Utilization (D&U)

The functions of D&U are:

(1) Analyzing, assessing and encoding the products of R&D;

(2) Organizing and programming of the available resources;

(3) Matching the organized resources with the encoded products of R&D;

(4) Acquainting the user with R&D products;

(5) Helping the user in analyzing the encoding of his problems;

(6) Encoding users' feedback;

(7) Matching the users' feedback with the products of step (3);

(8) Transforming users' encoded feedback to suggested change in R&D and resources.

These functions are not linear but constitute a complete cycle. Therefore its operation may begin at any point, depending on the specific practical problem or the intended goal.

Application of the Model

Dissemination and implementation of the Pennsylvania Department of Education elementary school project entitled Investigative Science in Elementary Education (ISEE) was undertaken as a practical application of the model. The three domains of the model are related to the practical problems of dissemination and implementation of ISEE in the following way:

Research and Development (R&D) is represented by the ISEE project with all its developed resources and aids.

Users are school teachers and school administrators.

Dissemination and Utilization (D&U) is a group of ISEE representatives and a series of established processes that carry out the functions of R&D as outlined in the model.

To assist with this elaborate and multi-facet task, a computer program was developed. The guideline for the development of this program was to organize the data in such a way that the connection of problem to solution would be as direct and as simple as possible.

The algorithm for matching problems to solutions was influenced by the systems analysis method called "Fault Tree" (Witkin, Stephens). The main

feature of this approach is that there can be a linear connection between problem and solution, unless something goes wrong. The main concern is, therefore, to predict what obstacles may interfere with the progress of the solution, rather than analyzing all the possible theoretical interconnections.

The second feature of the program is that it translates problems, whether personal attitudes or practical obstacles, into continuous functions that relate to continuous possibilities of the instructional project. Diagnosing the obstacles usually encountered in educational situations, five major areas of problems were detected: 1) awareness, 2) willingness, 3) support, 4) availability, 5) cost. The order of those obstacles is not arbitrary, but, rather represents a growing complexity of resources and aids, and a growing need for compromise on the variety of resources.

The program assumes that the primary user is the teacher with administration secondary. Nevertheless, in some cases, administrative problems are viewed as primary.

The user information fed into the program is based on structured and open-ended questionnaires that cover the following treatment-resource possibilities of ISEE in order of increased specifity: In-service education, equipment and materials, TV reception, general science teaching, special science teaching topics, teaching strategies. In those areas, ISEE can offer a linear solution.

The results of schools administration questionnaires are correlated with those of the teachers when they are conditional to the linear solution of the teachers' problems. The resulting printout of the program which was sent tc the participants included a list of suggestions and advise. The participants' reactions and feedback were recorded.

Since the results of this effort were expected to be a change trend, rather than a final positive or negative outcome and since no predetermined results were imposed on the experiment by means of a research design, the evaluation of the test of the model was done by applying the ethnographic technique.

Although the first tryout of this process was with ISEE, its features make it useful for application to other innovative instructional projects or even to any other change effort in social systems where the goal is defined and the resources organized.

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